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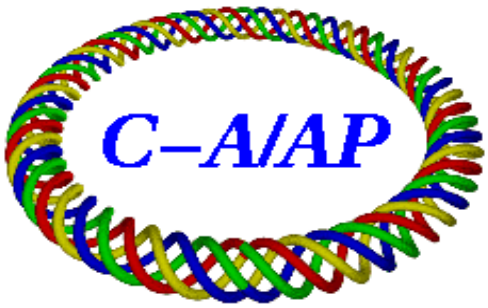
RHIC CORRECTOR POWER SUPPLY CONNECTIONS

H. Hahn , S. Tepikian



Collider-Accelerator Department
Brookhaven National Laboratory
Upton, NY 11973

Summary

In order to achieve agreement between the MAD-based RHIC Model and the proper excitation of the corrector magnets, the prescriptions for the power supply connections shown in the attached table must be enforced.

Power Supply Connections of Corrector Magnets.

Magnetic Measurement Convention

All magnets were measured and the magnetic field information was recorded according to an Aintrinsic@ convention, which can be summarized as follows:
All measurements are made from the lead end. When looking into the magnet from the lead end of the magnet, the positive x-axis points to the right hand side, while the positive y-axis points upwards. The origin is chosen to be at the center of the magnet. (This is different from the MAD convention, where the x- coordinate always points outward)

In a nominally single-harmonic magnet, the magnetic field, generated by a positive current into the positive pin, is fully defined by its strength and direction on the right (positive-x) half of the median plan. Here, all normal magnets have a pure positive B_y (pointing upward), and all skew magnets have a pure positive B_x (pointing to the right) field component.

The power supply is connected to the magnet at a terminal, to which the wire pair is brought and numbered so that the positive pin has always the larger number. For example, the 8-cm corrector magnets in the CQS (corrector-quadrupole-sextupole) unit are powered as follows:

dipole, horiz & vert	#12 positive, #11 negative
quadrupole, normal & skew	#10 positive, # 9 negative
octupole	# 8 positive, # 7 negative
decapole	# 6 positive, # 5 negative
sextupole magnet	# 4 positive, # 3 negative.

The 13-cm correctors in the triplet are powered during magnetic measurements as follows:

dipole, horiz & vert	#12 positive, #11 negative
sextupole, b2	# 8 positive, # 7 negative
octupole, b3	#10 positive, # 9 negative
decapole, b4	# 8 positive, # 7 negative
dodecapole, b5	# 6 positive, # 5 negative
Skew quadrupole, a1	# 8 positive, # 7 negative
skew sextupole, a2	# 4 positive, #3 negative
skew octupole, a3	# 6 positive, #5 negative
skew dodecapole, a5	#2 positive, #1 negative.

Optical Properties of Magnets

In addition on the direction of the exciting current, the Afunctional@or optical properties of a magnet, i.e its effect on the beam, will depend on the ring into which it is installed and on the its direction with respect to the beam in that ring. For RHIC, the convention defining the Ainstalled@ direction of the main dipole and quadrupole magnets in both rings refers to the blue ring, in which the beam travels clockwise (CW). Extending this convention to corrector magnets has the ring-wide consequence that a clockwise installation in the blue ring implies that the beam enters the non-lead end, whereas in the yellow ring clockwise installation implies beam entering the lead end of any magnet.

All arc dipoles are CW installed.

The installation of the arc quadrupole magnets depends on the sector location as follows:

Sector 2,3,6,7,10 & 11 is CW,

Sector 1,4,5,8,9 & 12 is CCW.

Dipole corrector, sextupole, and trim quadrupole magnets are attached to a main quadrupole and the installation of the combined unit follows the rule for the main quadrupole. Depending on the mechanical arrangement of the magnets within the unit, the attached magnet can be clockwise (CW) or counter-clockwise (CCW). The clockwise unit has the attached magnets installed as

in CW-CQS : corrector CW, sextupole CCW
in CW-CQT: corrector CW, trim magnet CCW
in CW-Q2: corrector 1(style I,J) CCW
in CW-Q3: corrector 2(style K) CW, corrector 3(style L,M) CCW

In the triplets, the lead end of Q1 and Q2 is on both sides away from the IP and in Q3 towards the IP.

Prescriptions for the Power Supply Connections

In order to bring the above rules into conformance with the MAD convention used in the RHIC model, the power supply connection of the magnets in the ring will, in some cases, require polarity changes from those used for the magnetic measurements to accommodate the specific ring location and the installed direction of the magnets. The corrector power supply connections have to be done according to the prescriptions of the attached Table.

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CORRECTOR POWER SUPPLY CONNECTIONS

Positive: connected as for magnetic measurements
Reverse: connections reversed from magnetic measurements
CW installation: beam enters **non-lead end** in BLUE, **lead end** in YELLOW
CCW Installation: beam enters **non-lead end** in YELLOW, **lead end** in BLUE

BLUE	YELLOW
b1(quad), b3 (oct), b5 (dodec)	
CW: Positive CCW: reverse	CW: Reverse CCW: positive
b2 (sext), b4(dec)	
CW: positive CCW: Positive	CW: reverse CCW: reverse
Skew a1(quad), a3(oct), a5(dodec)	
CW: reverse CCW: reverse	CW: Positive CCW: Positive
Skew a2(sext)	
CW: reverse CCW: positive	CW: positive CCW: reverse
